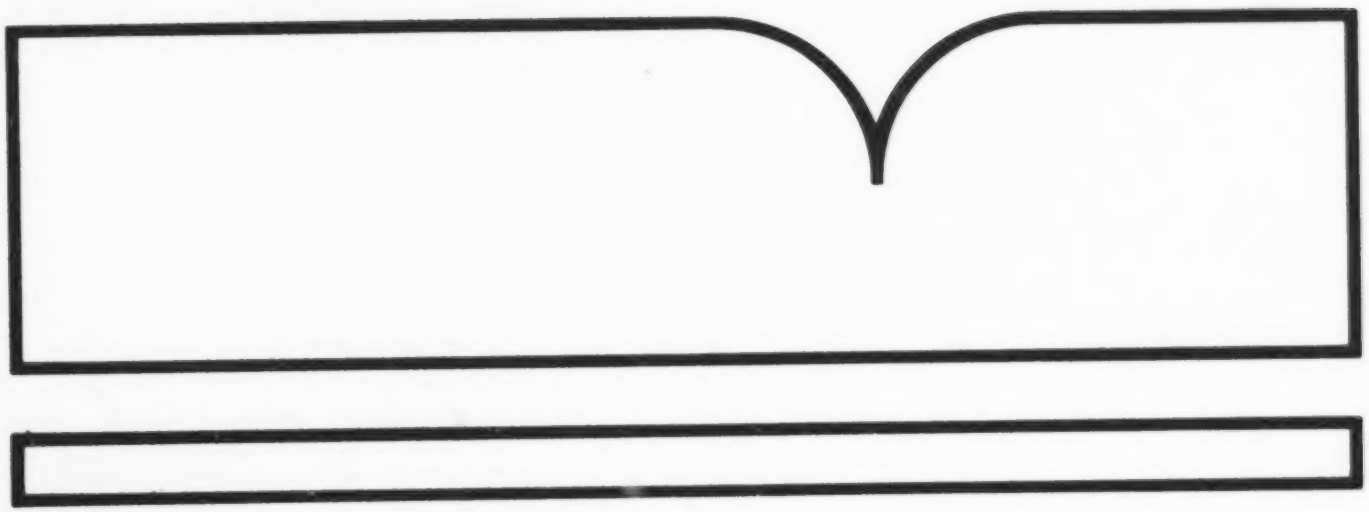
PB86-224904

Superfund Enforcement Decision Document (EPA Region 10): Queen City Farms Site King County, Washington (Initial Remedial Measure), October 1985

(U.S.) Environmental Protection Agency
Washington, DC

24 Oct 85



U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R10-85/007
October 1985

PB86-224904

EPA

Superfund Enforcement Decision Document:

Queen City Farms, WA (IRM)

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NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA
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1. REPORT NO.	2	3. RECIPIENT'S ACCESSION NO
EPA/ROD/R10-85/007		PB86 224904/AS

4. TITLE AND SUBTITLE	5. REPORT DATE
SUPERFUND ENFORCEMENT DECISION DOCUMENT Queen City Farms, WA (IRM/EDD)	October 24, 1985
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO
Same as box 12.	11. CONTRACT/GRANT NO
12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	Final ROD Report
	14. SPONSORING AGENCY CODE 800/00

15. SUPPLEMENTARY NOTES

16. ABSTRACT

The Queen City Farms (QCF) site is a 320-acre parcel of land located approximately 2.5 miles north of the town of Maple Valley in King County, Washington. The site includes a wooded area, a lake known as Queen City Lake, six industrial waste disposal ponds, an airstrip, several residences, and a gravel pit. The six ponds on the site were used for the disposal of industrial wastes from approximately 1955 to 1964. Because of the time period, few records exist regarding the exact types of wastes taken to the site. However, in 1980 six waste ponds were sampled by EPA contractors. The analyses of water, sludge, and sediment samples identified the presence of 44 priority pollutants. Some of the contaminants found were: chromium, lead, PCBs, acids, volatile organics, toluene and trichloroethylene (TCE).

The recommended Initial Remedial Measure is to be carried out in three phases. Phase 1 will include mobilization onto the site, installation of the initial upgradient water diversion system, and processing of Pond 1 waste. Phase 2 will involve processing of Pond 2 and 3 materials. Phase 3 will include the installation of the final upgradient water diversion system and cap, final grading and revegetation, and demobilization from the site.

A truck-mounted phase separator will be located onsite to process the waste. Pond water will be used to charge the separator. Sludge will be pumped to the separator
(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Queen City Farms, WA (IRM/EDD) Contaminated Media: gw, sediments, sludge Key contaminants: acids, carcinogenic compounds, chromium, heavy metals, PCBs, phenols, tetrachloroethylene (PCE), toluene, trichloroethylene (TCE), VOCs		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report) None	21. NO. OF PAGES 28
	20. SECURITY CLASS (This page) None	22. PRICE

16. ABSTRACT (continued)

using a pond skimmer which will be supplemented with mechanical excavation of sludge. The phase separator will separate the sludge into four components: grit, cake, oils, and water. The liquid portions of the separated phases will be stabilized such that an exothermic reaction occurs and no free liquid is present. Stabilized material and other solid products produced during the phase separation will be treated as hazardous waste and transported to a RCRA-permitted chemical waste landfill. In addition, contaminated soils which surround the ponds will be moved into depressions created by removal of the chemical sludge (prior to capping). Finally, to assess the performance of this source control remedial action, a monitoring system will be installed. Total capital cost for all phases of the selected initial remedial measure is estimated to be $3,439,000. In accordance with the CERCLA Section 106 Consent Order, the PRPs will establish a perpetual trust to assure the continued funding of monitoring and maintenance activities in the area of Ponds 1, 2, and 3, where the Initial Remedial Measures will be conducted.

ENFORCEMENT DECISION DOCUMENT
INITIAL REMEDIAL MEASURE ALTERNATIVE SELECTION

SITE: Queen City Farms, King County, Washington

DOCUMENTS REVIEWED:

I am basing my decision primarily on the following documents describing the analysis of the cost effectiveness of initial remedial measures for the Queen City Farms site:

- Assessment of Hydrogeology and Groundwater Quality, Surficial Aquifer, Queen City Farms, December 1983.
- Focused Remedial Investigation, Queen City Farms, February 1985.
- Focused Feasibility Study for Remedial Action, Queen City Farms, June 1985.
- Public Comment Work Plan, October 1985.
- Summary of Initial Remedial Alternative Selection, October 1985.
- Community Relations Responsiveness Summary.
- Staff Summaries and recommendations.

DESCRIPTION OF SELECTED INITIAL REMEDIAL MEASURE:

- Phase Separation of Sludge: A truck-mounted phase separator will be located on-site. Accumulated precipitation in the ponds (pond water) will be used to charge the separator. Sludge will be pumped to the separator using a pond skimmer which will be supplemented with mechanical excavation of sludge. The phase separator will separate the sludge into four components: grit, cake, oils, and water.
- Liquid Stabilization: The liquid portions of the separated phases will be stabilized such that an exothermic reaction occurs and no free liquid is present.
- Excavation of Working Surface Contaminated Soils: Contaminated soils which surround the ponds will be moved into the depressions created by removal of the chemical sludge (prior to capping).

- Stabilized material and other solid products produced during the phase separation will be treated as hazardous waste and be loaded onto trucks and transported to a Resource Conservation and Recovery Act (RCRA) permitted chemical waste landfill.

- Up-gradient Diversion System: A lined, gravel-filled trench will be installed to intercept surface water run-off and shallow groundwater flow before the water enters the Remedial Action Area.

- Impermeable Cover: An impermeable cover system including a synthetic membrane will be placed over the contaminated area. During the final design phase of work, the desirability of supplementing the proposed cover system with low permeability soils will be assessed.

- Monitoring System: A series of wells will be installed to monitor the effectiveness of the system in preventing water from contacting the waste. These wells will be screened at the contact between the underlying low permeability strata and the overlying sand and gravel deposits.

DECLARATIONS:

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the above Description of Selected Initial Remedial Measure at the Queen City Farms site is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. The State of Washington has been consulted and is presently reviewing the approved initial remedial measure.

All off-site disposal shall be in compliance with the policies stated in Jack W. McGraw, Acting Assistant Administrator, Office of Solid Waste and Emergency Response's May 6, 1985 memorandum entitled Procedures for Planning and Implementing Off-site Response Actions. In addition, I have determined that the implementation of the selected initial remedial alternative is more cost effective than other remedial actions and is necessary to protect public health, welfare and the environment.

October 24, 1985
Date

Regional Administrator

SUMMARY OF INITIAL REMEDIAL ALTERNATIVE SELECTION
QUEEN CITY FARMS

SITE LOCATION AND DESCRIPTION

The Queen City Farms (QFC) site is a 320 acre parcel of land (S. 1/2 Sec 28, T. 23N, R. 6E, WM) located approximately 2 1/2 miles north of the town of Maple Valley in King County, Washington. The site includes a wooded area, a lake known as Queen City Lake, six industrial waste disposal ponds, an airstrip, several residences, and a gravel pit (Figure 1).

Land use in this area is predominamtly low-density residential, except for King County's Cedar Hills Landfill immediately north of the site and several small businesses in Maple Valley. There are approximately 105 public and private drinking water wells within a one-mile radius of the site.

SITE HISTORY

The site was purchased by the present owners in 1952. The six ponds on site were used for the disposal of industrial wastes from approximately 1955 to 1964. Because of the time period few records exist regarding the exact types of wastes taken to the site. Financial records indicate that the Boeing Company was the major contributor of wastes at this site. Because disposal activities ceased in the mid-1960's there were never any Federal permits applied for or received.

CURRENT SITE STATUS

In 1980 the six waste ponds were first sampled by the Environmental Protection Agency (EPA) contractors. The analyses of water, sludge and sediment samples identified the presence of 44 of EPA's 129 Priority Pollutants (Table 1.).

In May 1983, EPA directed their contractor to prepare a test well drilling program to investigate the area around the waste ponds. In July EPA's contractor completed their first and only boring at the site. At that point, QCF's contractor took over the field investigation, drilling an additional 15 borings. This work was conducted under a CERCLA Section 106 Consent Order signed August 17, 1983. The analyses of soil and groundwater samples confirmed the presence in the soil and shallow groundwater beneath the site of 24 of the original 44 Priority Pollutants.

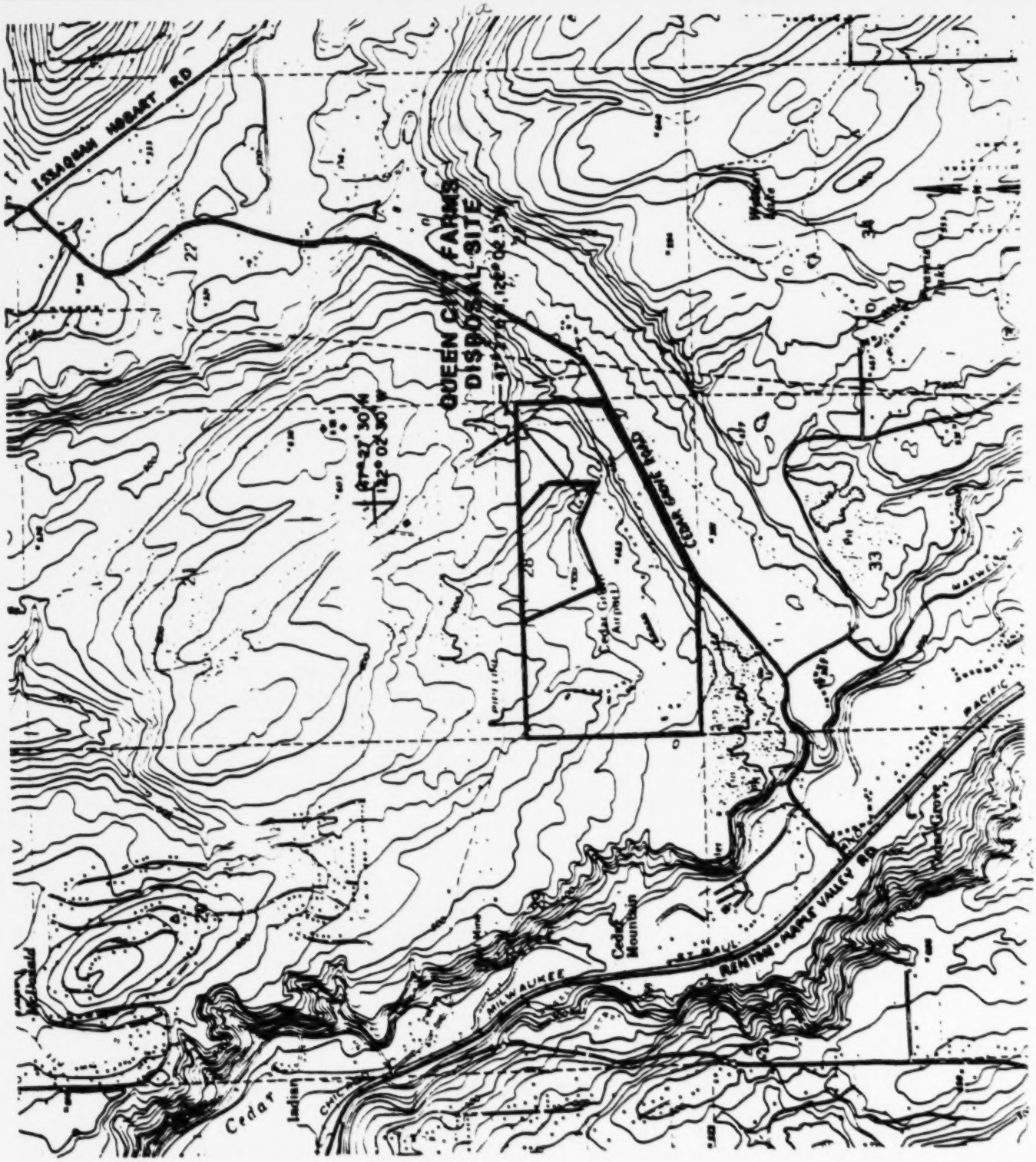
ISSAQUAH HOBART RD
QUEEN CITY FARMS
DISPOSAL SITE
CEDAR FALLS ROAD
RENTON-MAPLE VALLEY RD
PACIFIC
MAXWELL
Cedar Mountain
MILWAUKEE
Cedar
Indian
22
28
33

FIGURE 1

Priority Pollutants Identified in the Queen City Farms Waste Ponds

Number following chemical is highest concentration found in parts per million

Metals

Antimony	1.8
*Arsenic	3.6
Beryllium	0.23
**Cadmium	81
Chromium	33,600
Copper	820
Lead	1100
Mercury	0.01
*Nickel	236
Selenium	2.3
Silver	0.66
Zinc	410

Miscellaneous

Cyanide	34
Phenolics	224

Pesticides

*PCB 1260	125

Base/Neutral Extractibles

1,2,4-Trichlorobenzene	1.7
1,2-Dichlorobenzene	12
1,3-Dichlorobenzene	3.6
**Napthalene	250
Bis (2-Ethylhexyl) Phthalate	2[illegible]
Diethyl Phthalate	3800
**Chrysene	140
Anthracene	790
**Pyrene	460

Acid Extractibles

2,4,6-Trichlorophenol	270
P-Chloro-M-Cresol	90
2,4-Dichlorophenol	140
2,4-Dimethylphenol	261
2-Nitrophenol	90
Pentachlorophenol	420
Phenol	130

Volatile Organics

*Benzene	58
Chlorobenzene	0.04
1,1,1-Trichloroethane	0.41
1,1-Dichloroethane	3.3
*Chloroform	0.29
1,1-Dichloroethylene	0.005
1,2-Trans-Dichloroethylene	6.5
CIS-1,3-Dichloropropene	0.34
Ethylbenzene	30
Methylene Chloride	315
Tetrachloroethylene	13
Toluene	625
**Trichloroethylene	536

*known carcinogen
**suspected carcinogen

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TABLE 1

The findings of this 1983 investigation suggest that a significantly contaminated shallow groundwater aquifer beneath the waste ponds is perched on a layer of silt and glacial till stratum at a depth of from 16 to more than 30 feet. However, approximately 200 feet south of the ponds, drilling did not encounter this confining layer of till, but instead 75 to 100 feet or more of dry sand and gravel. This information suggests that the perched groundwater may be "spilling over" the edge of the till stratum and percolating downward, which may create a recharge mound in an underlying aquifer. Deeper on-site wells have shown the underlying aquifer to be contaminated. Contaminants in this aquifer may pose a significant and continuing threat to the other aquifer(s) in the area. Further studies will be conducted during the Remedial Investigation/Feasibility Study (RI/FS) to determine the continuity, gradient and relationship of these aquifers.

In August and September 1984, QCF conducted an additional field investigation in the immediate vicinity of Ponds 1, 2, and 3. The purpose of this investigation was to determine the volume of the industrial wastes sludges in the ponds and the volume of contaminated soil adjacent and beneath these ponds. Seismic profiles, test pits, and soil borings were also used to characterize the geology and extent of contamination in the vicinity of the ponds.

This investigation determined the volume of industrial waste sludge in Ponds 1, 2, and 3 to be approximately 5200 cubic yards, and the volume of contaminated soil in the berms between the ponds, the soil immediately beneath the ponds and in the "working surface" adjacent to the ponds to be an additional 16,800 cubic yards. Chemical analyses of the sludge and some of the soil samples confirm the presence of significant concentrations of heavy metals, chlorinated hydrocarbons, phenolic compounds, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, ketones and aromatic hydrocarbons.

Subsequent to this second investigation, QCF began work on a Focused Feasibility Study to examine possible initial remedial measures for the removal and/or containment of the wastes in Ponds 1, 2, and 3 and in the underlying and adjacent soils. On June 28, 1985, QCF delivered to EPA a draft Focused Feasibility Study report. This report examined eleven initial remedial alternatives under the broad categories of infiltration prevention, groundwater diversion, contaminated soils isolation or removal and chemical sludge stabilization, solidification, isolation or removal, and incineration.

ENFORCEMENT

On September 16, 1985, EPA issued 44 Notice letters under Section 104 of CERCLA to a list of Potentially Responsible Parties (PRP) provided to EPA by QCF. These letters request generator information regarding disposal activities at the QCF site. Most PRP's have responded indicating that little or no records from that time period exist regarding wastes disposed of at the site. To date, the Boeing Company has been the only PRP to provide a brief listing of wastes taken to the site. QCF has financial records from the operation of the site, but no records of waste type or quantity.

ALTERNATIVE EVALUATION

There are twelve potential alternative courses of action identified below. The initial remedial measures examined would all be characterized as source control measures as defined in 40 CFR Part 300.68(e)(2). The primary objective of the proposed action at this site is to eliminate future groundwater contamination from Ponds 1, 2, and 3 and the immediate vicinity. The general remedial alternatives considered to achieve this objective were: infiltration prevention; groundwater diversion; contaminated soil isolation or removal; and, chemical sludge stabilization, solidification, isolation or removal. A brief description of each option and the consequence of its implementation is presented.

Option 1: Physical Stabilization and Isolation

- Description: Accumulated precipitation on the surface of the ponds will be pumped and treated off-site. Chemical sludge in the ponds will be physically stabilized by introduction of rock fill or other material. The contaminated working surface will be moved to within the pond area and the berms, and contaminated soil will be left in-situ. An up-gradient groundwater diversion system, an impermeable cover and a down-gradient slurry wall will be constructed.

- Advantages: Minimizes further contact of precipitation and shallow groundwater with wastes and that seepage from the ponds could be intercepted. Short time to completion.

- Disadvantages: Source of contamination (chemical sludge) remains in place. Additionally, the build up of hydraulic pressure could compromise the barrier properties of the slurry wall.

Option 2: Solidification, Diversion System, and Cover

- Description: Accumulated precipitation will be pumped and treated off-site. Chemical sludge in the ponds will be pumped to a solidification unit, mixed with fly ash, and returned to the ponds. The contaminated working surface soils will be moved to within the pond area and the berms will be left in-situ. An up-gradient groundwater diversion system and an impermeable cover will be constructed.

- Advantages: Minimizes further contact of precipitation and groundwater with wastes. Solidification of chemical sludge (reducing the potential for residual pond seepage). Lower permeability of remaining wastes. Solidified chemical sludge will act as a better base for the cover.

- Disadvantages: Longer time to completion, source of contamination remains in place, and no down-gradient barrier to capture residual seepage. Sludge handling and solidification may be difficult because of sludge viscosity.

Option 3: Solidification and Isolation

- Description: Similar to Option 2 except accumulated precipitation will be solidified along with chemical sludge and a down-gradient slurry cut-off wall will be constructed to further isolate the wastes. Berms will be left in-situ.

- Advantages: Isolation of wastes. Solidification of all liquids in ponds as well as advantages of Option 2.

- Disadvantages: Longer time to completion, increased volume of material caused by solidifying source of contamination which remains in place. Sludge handling and solidification may be difficult because of sludge viscosity.

Option 4: Solidification and Isolation with Water Treatment

- Description: Similar to Option 3 except accumulated precipitation will be pumped and treated off-site.

- Advantages: Less time and same advantages as Option 4, chemical sludge is solidified (reducing the potential for residual pond seepage).

- Disadvantages: Source of contamination remains in place.

Option 5: On-site Phase Separation, Solidification, and Isolation

- Description: Chemical sludge and accumulated precipitation will be pumped to an on-site phase separation unit. The separated organic phase will be mixed with a solidifying agent and returned to the ponds. Working surface soils will be deposited in pond areas. The majority of the accumulated precipitation and entrained water will be consumed through evaporation during phase separation. Any residual water will be solidified. An up-gradient ground water diversion system, an impermeable cover, and down-gradient slurry wall will be installed. Berms will be left in-situ.

- Advantages: Volume reduction of material requiring solidification, possible reduction in sludge toxicity due to hot, caustic processing of chemical sludge. Reduced difficulty in handling sludge with higher temperatures.

- Disadvantages: Longer time to complete than some earlier options, possible air pollution impacts associated with elevated temperature (approximately 180 F) processing of chemical sludge.

Option 6: On-site Phase Separation, Solidification, and Off-Site Chemical Landfill Disposal

- Description: Similar to Option 5 except the separated solids and any residual waste (solidified) will be transported to a chemical landfill for disposal. Also, the down-gradient slurry wall is omitted. Separated solids would likely not require further solidification.

- Advantages: Removal of principal contaminant source, possible reduction in sludge toxicity due to hot, caustic processing.

- Disadvantages: Longer time to complete then some earlier options, possible air pollution impacts associated with elevated-temperature processing of chemical sludge.

Option 7: Off-site Chemical Landfill, Solidification and Water Treatment

- Description: Accumulated precipitation will be pumped and treated off site. An up-gradient diversion system will be installed. Chemical sludge from the ponds will be pumped, solidified and transported to a permitted chemical landfill. An impermeable cover will be installed. Berms will be left in-situ.

- Advantages: Removal of principal source of contamination.

- Disadvantages: Larger volume of material to dispose of off-site because sludge in ponds not separated into phases prior to solidification.

Option 8: Off-site Chemical Landfill of Sludge, Berms, and Working Surface Soils with Water Treatment

- Description: Similar to Option 7 except the berms and working surface soils will be excavated and transported to a permitted chemical landfill.

- Advantages: Removal of principal source of contamination as well as contaminated soil.

- Disadvantages: Larger volume of sludge and contaminated soil to be disposed of off-site.

Option 9: Off-site Incineration of Chemical Sludge

- Description: Accumulated precipitation will be pumped and treated off-site. An up-gradient diversion system would be installed. Chemical sludge will be pump/excavated and shipped to a permitted waste incineration facility. Contaminated working surface soils will be moved to within the pond area and the berms would be left in-situ. An impermeable cover would be installed.

- Advantages: Removal of principal source of contamination.

- Disadvantages: Probable delays in incineration due to limited domestic capacity. May not be practical to ship in tankers. If drums necessary, cost and time will increase significantly (20,000 drums required).

Option 10: Off-site Incineration of Chemical Sludge, Berms, and Working Surface Soils

- Description: Similar to Option 9 except berms and working surface soils will also be shipped to a permitted waste incineration facility.

- Advantages: Removal of principal source of contamination and contaminated soil.

- Disadvantages: Very long time to complete. Probable delays in incinerator due to limited domestic capacity. May not be practical to ship in tankers. If drums necessary, cost and time will increase significantly (20,000 drums required).

Option 11: On-site Incineration of Chemical Sludge, Berms, and Working Surface Soils.

- Description: An up-gradient diversion system will be installed and an on-site incinerator will be constructed. Accumulated precipitation, chemical sludge, working surface soils, and berms will be incinerated. Ash generated from the incinerator will either be placed in the area of the ponds or disposed of off-site at a hazardous waste landfill. In either case an impermeable cover will be installed.

- Advantage: Removal of principal source of contamination as well as a portion of the contaminated soils.

- Disadvantages: Probable delays due to difficulties of acquiring on-site incinerator and possible permitting requirements.

Option 12: No Action

Under this option no remedial activities would be conducted at the site at this time. The overall RI/FS would be conducted over the next year. Any necessary remedial activities identified in the RI/FS would then be conducted. Because of this potential delay of up to several years and because any final remedial action would likely include the removal of the sludges from Ponds 1, 2, and 3, it was determined that no action was inappropriate.

ALTERNATIVE SCREENING PROCESS

Criteria considered in the screening included technical feasibility, effectiveness, institutional requirements, costs, and other site and technology-related considerations. Because the overall RI/FS has not yet been conducted, the final remedial actions for the site have not yet been determined. For this reason, it is most important that the chosen IRM not interfere with and, to the extent possible, be compatible with future activities at the site.

Options 1 through 5 were eliminated early in the screening process because in each of these options the sludge would remain on site leaving over a million gallons of a highly concentrated source of contamination. While these options would attempt to isolate the sludge in the pond area, it is unlikely that on-site disposal of such highly concentrated wastes would be compatible with the final remedial action at the site.

Options 9, 10, and 11 were next eliminated because of the limited incinerator capacity around the country at present, particularly in the Northwest. This limited capacity could potentially extend the time of this IRM activity to several years which would be incompatible with future RI/FS activities on site. These three options were also the most expensive because of increased transportation costs and the cost of incineration itself.

These initial screenings narrowed the selection down to Options 6, 7, and 8. All of these options would remove the sludge from the three ponds for disposal at a RCRA-permitted disposal facility. The three options varied primarily in the methods of handling the sludge from the ponds and the amount of contaminated soil that would also be disposed of off site.

EPA favored Option 6 because it employed volume reduction (phase separation and solidification) processing to minimize the amount of source material that would have to be disposed of at a RCRA facility. The remaining contaminated soils would be consolidated in a central location followed by capping and isolation via a groundwater diversion system. EPA believes Option 6 will be most compatible with future RI/FS activities at the site.

Tables 2 and 3 list the options and the technologies examined, and also the relative costs of each option.

COMMUNITY RELATIONS

The following documents were made available for public comment:

- Assessment of Hydrogeology and Ground Water Quality, Surficial Aquifer, Queen City Farms, December 1983.
- Focused Remedial Investigation, Queen City Farms, February 1985.
- Focused Feasibility Study for Remedial Action, Queen City Farms, June 1985.
- Public Comment Work Plan, Option 6, October 1985
- Public Comment CERCLA Section 106 Consent Order for implementing IRM activity, October 1985.

These documents were available for review at the Maple Valley Library and also at the EPA Region 10 library in Seattle.

There was a public comment period for the Work Plan from October 2 through October 16. On October 10, a public meeting was held in Maple Valley to present and discuss both the Work Plan and the Consent Order. Notices of the meeting and public comment period were sent out to 68 nearby residents, county and state agencies, elected officials, and local newspapers. The notice of the public meting was published in two of the local newspapers. A second public comment period for the Consent Order was scheduled from October 10 through October 24.

Eight people attended the public meeting including two representatives of King County, an attorney for Queen City Farms, two representatives from environmental groups and two residents.

No comments were received during either of the public comment periods.

Table 2 - Cost Summary for Options

Item	Cost in Thousands of Dollars										
	1	2	3	4	5	6	7	8	9	10	11
Mobilization	100	100	100	100	100	100	100	100	100	100	1600
Up-gradient Diversion	14	14	14	14	14	14	14	14	14	14	14
Down-Gradient Slurry Cut-Off	239		239	239	239						
Impermeable Cover	131	131	131	131	131	131	131	131	131	131	131
Physical Stabilization	471										
Solidification		916	1107	916	378	235	656	656			
Off-Site Disposal						1256	3271	8524			0-3015
Incineration									5743	18987	13500
On-Site Phase Separation					642	642					
Off-Site Water Treatment	140	140		140			140	140	140	140	
Excavation, Pumping and Temporary Tanks		5	5	5			5	88	5	88	88
On-Site Disposal	18	63	73	63	35	18	18		18		
General Construction	125	125	125	125	125	205	200	235	200	200	235
Non-Construction	205	265	265	265	265	265	235	385	265	385	385
Subtotal	1443	1759	2059	1998	1929	2866	4770	10273	6616	20045	15953-189
Contingency	289	352	412	400	386	573	954	2055	1323	4009	3190- 37
Total Cost	1732	2111	2471	2398	2315	3439	5724	12328	7939	24054	19143-227
Construction Time in Weeks	18	27	29	27	40	27	25	42	34	130	186

Option Summary

	Remedial Action									
	Up-Gradient Diversion System	Down-Gradient Slurry Cut-Off Wall	Impermeable Cover	Physical Stabilization	Solidification	On-Site Phase Separation	On-Site Disposal	Off-Site Water Treatment	Off-Site Disposal	Incineration
Option 1	●	●	●	●			●	●		
Option 2	●		●		●		●	●		
Option 3	●	●	●		●		●			
Option 4	●	●	●		●		●	●		
Option 5	●	●	●		●	●	●			
Option 6	●		●		●	●			●	
Option 7	●		●		●			●	●	
Option 8	●		●		●			●	●	
Option 9	●		●					●	●	●
Option 10	●		●					●		●
Option 11	●		●				●		●	●

TABLE 3

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

All facets of the proposed Initial Remedial Measure will be consistent with the technical requirements of other environmental laws. The off-site transportation and disposal of the processed waste sludge and contaminated soil will be in accordance with appropriate RCRA regulations, including manifesting of wastes and shipment to a RCRA-permitted facility. The cap to be constructed over the site will be consistent with RCRA guidelines. Monitoring will be conducted to ensure that the groundwater diversion system is operating properly to minimize migration of contaminants from the area. Long term closure and monitoring of the site will be addressed at the completion of the final remedial activities.

RECOMMENDED ALTERNATIVE

The recommended Initial Remedial Measure is to be carried out in three phases. Phase 1 will include mobilization onto the site, installation of the initial upgradient water diversion system, and processing of Pond 1 waste. Phase 2 will involve processing of Pond 2 and 3 materials. Phase 3 will include the installation of the final upgradient water diversion system and cap, final grading and revegetation, and demobilization from the site.

- Phase 1 - Mobilization, Pond 1 Sludge Processing, and Off-Site Transport.

- Mobilization

Mobilization onto the site will be done in six steps, which are as follows:

1. Set-up of contamination and personnel protection zones
2. Preparation of the working area
3. Bringing in utilities
4. Set-up of support facilities (field offices, crew quarters, and decontamination units)
5. Importation of supplies and process equipment set-up
6. Activation of the monitoring systems

These activities will be conducted concurrently with the installation of the temporary upgradient water diversion system. However, both the mobilization and water diversion system activities will be completed prior to the processing of Pond 1 waste. The site layout for construction and processing activities is shown in Figures 2 and 3. Three work zones will be established as shown in Figure 2. Zone 1 will be those areas where direct contact with the ponds is likely. In general, entry to this zone will require Level C protection which will be upgraded to Level B during the excavation operations. Zone 2 generally encompasses those areas which have contaminated working surfaces and where the dirty grubbing wastes will be

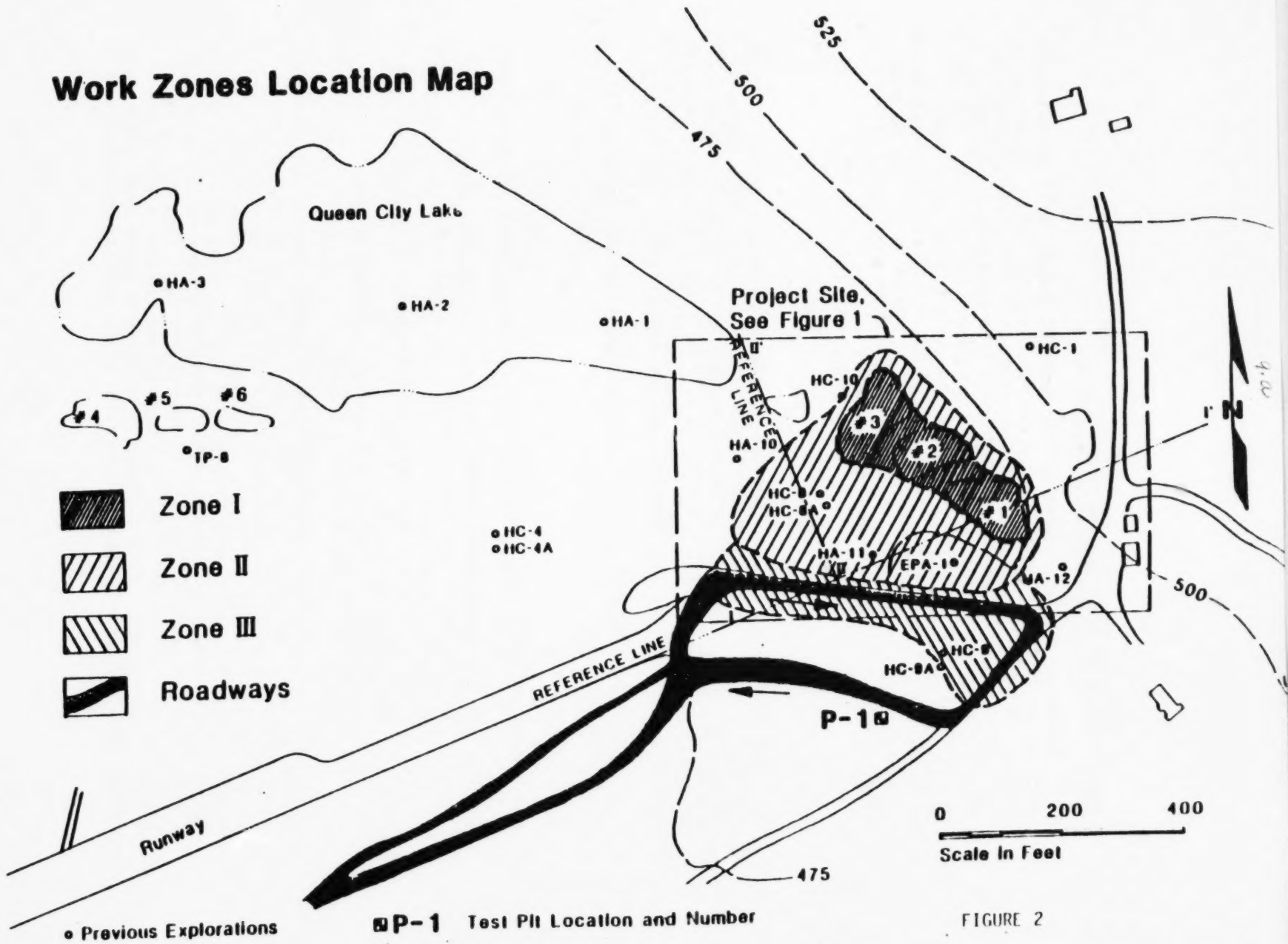
Work Zones Location Map
Queen City Lake
HA-3
HA-2
HA-1
Project Site,
See Figure 1
REFERENCE LINE
HC-10
HA-10
#1
#2
#3
#4
#5
#6
TP-8
HC-1
HC-4
HC-4A
HC-8
HC-8A
HA-11
EPA-1
HA-12
Zone I
Zone II
Zone III
Roadways
REFERENCE LINE
P-1
Runway
525
500
475
0
200
400
Scale in Feet
Previous Explorations
P-1 Test Pit Location and Number

FIGURE 2

Facilities Layout Location Map

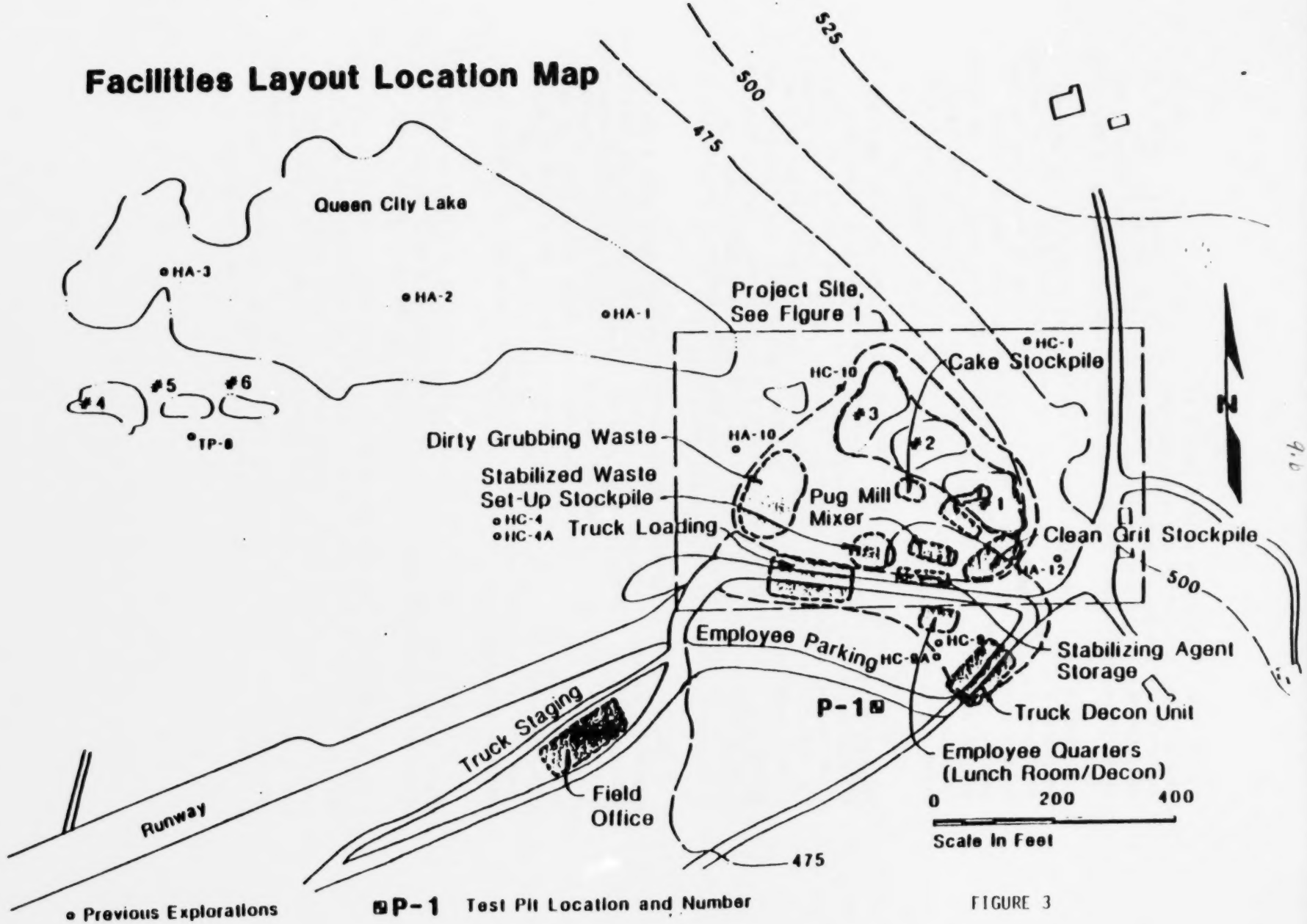

FIGURE 3

stockpiled. Protection within Zone 2 is anticipated to Level D; however, as appropriate, protection could be upgraded as far as Level B. Zone 3 is comprised of the areas primarily involved in truckloading and the decontamination cleanup activities. This is a transitional zone to the clean surrounding areas and no special attention is required in this area.

Set-up Processing Equipment: With the site prepared, the process equipment and supplies will be brought in. The principal piece of process equipment is the phase separation unit. This piece of equipment has two major components: the pond skimmer/intake structure, and the phase separation/cleaning unit. The large processing unit which does the phase separation/cleaning will be spotted such that the pond skimmer/intake structure and its associated umbilical cord to the processing unit will allow the skimmer mobility across the entire extent of Pond 1.

The phase separator also requires three support units to take the recovered byproducts. They are: tankage for the organic fraction, transport bins for grit, and transport bins for sludge cake. All three of these support units will be located near the phase separator. To prepare the wastes for transport and disposal off-site, a stabilization unit will also be spotted within Zone 2. This batch mixing unit also requires the support of a stabilization agent storage and feed unit. Output from the batch mixing unit will be transported to a setup stockpile near the truckloading pad. Concurrently, near the field office, a truck scale will be placed for control of transport activities.

The slurried waste drawn up by the pond skimmer goes onto a shaker washer device where high pressure nozzles clean and separate the large grit from the organic fractions. The fractions containing substantial amount of fines goes through a centrifuge unit where the liquid portion including water and organics is separated from the solid fines which come out as a cake. The water and organic fractions are then sent to a phase separator where the water is recycled back into the pond skimmer after being reheated. The organic fraction is separated out and put in tankage for eventual stabilization.

Grit and cake coming off the centrifuge will be disposed of off-site. The liquid organic fractions from the phase separator will be put in temporary tankage and eventually stabilized in the batch mixer plant.

To dispose of contaminated water and liquid organic fraction off-site, stabilization to remove the free liquids will be required. To accomplish this in a pug mill type device, a set weight of Pozzolanic stabilization agent and/or other stabilizing materials will be loaded into the batch mixing unit. The liquid fraction will be metered as the pug mill mixes the two components. The two components then undergo an exothermic reaction which stabilizes the liquid waste and removes all free liquids.

- Phase 2 - Processing of Pond 2 and 3 Sludge

Phase 2 is the processing of Pond 2 and Pond 3 sludge. The activities involved in processing wastes from these ponds are similar to those described above for Pond 1 except that approximately the last foot of sludge from Pond 3 will be mechanically excavated and loaded for stabilization. Similarly, upon excavation of Pond 2 the remaining stored dirty grubbing materials will be placed in the pond. It is anticipated that after Pond 3 excavation, dirty grubbing materials will be gone and only working surface materials will be going into Pond 3.

- Phase 3 - Installation of Permanent Upgradient Diversion System, Monitoring System, Cover, Final Grading and Demobilization

Work in Phase 3 will start as soon as Pond 3 sludge is removed, processed, and hauled off-site. The contaminated working surface soils, demolished asphalt work pads, and other contaminated soil will be placed into Ponds 1, 2, and 3.

Once all the area outside the pond site has been cleared, clean backfill will be imported to raise grade to desired elevations. The cover system subgrade will be compacted and graded.

The purpose of the upgradient diversion system is to intercept surface water and near-surface groundwater that flows between the ground surface and the top of the low permeability strata (till or silt) which underlie the ponds. The water that flows above these strata is a major source of groundwater flowing beneath the ponds.

The upgradient diversion system will be constructed by excavating a trench to a depth of at least 5 feet into the till on the northeast side of all three ponds (see Figures 4 and 5). The downslope, bottom, and upslope (to above drain pipe invert) side of this trench will be lined with impermeable membrane to prevent water that enters the trench from continuing to flow downgradient towards the pond. After the impermeable membrane is installed, filter fabric will be used to form an envelope about the trench and a perforated PVC pipe will be laid in the bottom of the trench. The trench will be backfilled with a free-draining sand and gravel so that water that enters the trench can flow freely down into the perforated pipe drain to the system outlet. In order to prevent surface water from flowing over the trench, a berm approximately 2 feet high will be constructed on the downslope side of the trench.

After the sludge has been removed, the ponds will be backfilled with a combination of clean and contaminated soils. The backfill material will include contaminated working surface soil as well as contaminated vegetation that has been removed from the site. The contaminated vegetation will be chipped prior to placing in the pond to minimize future settlements.

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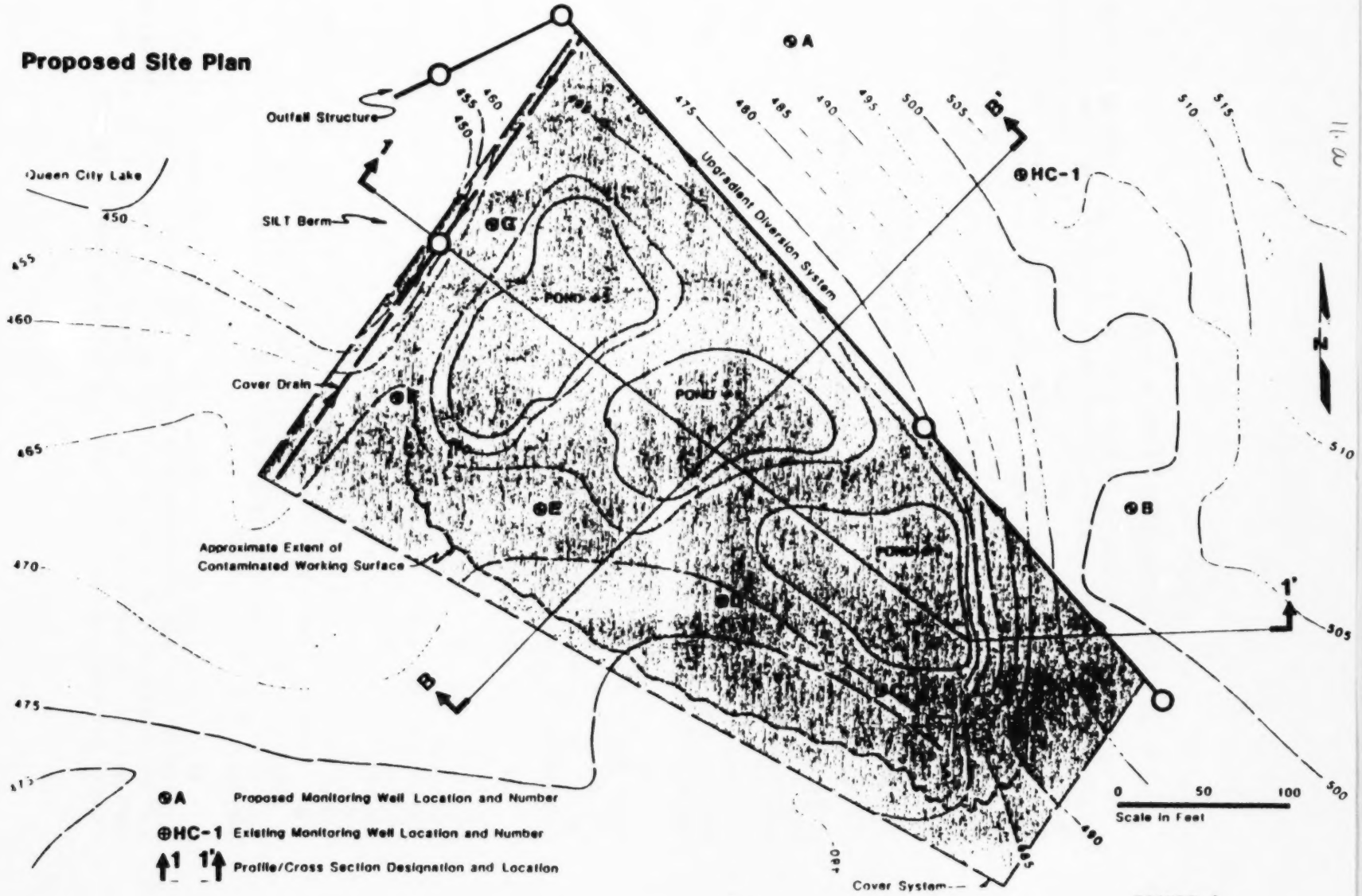
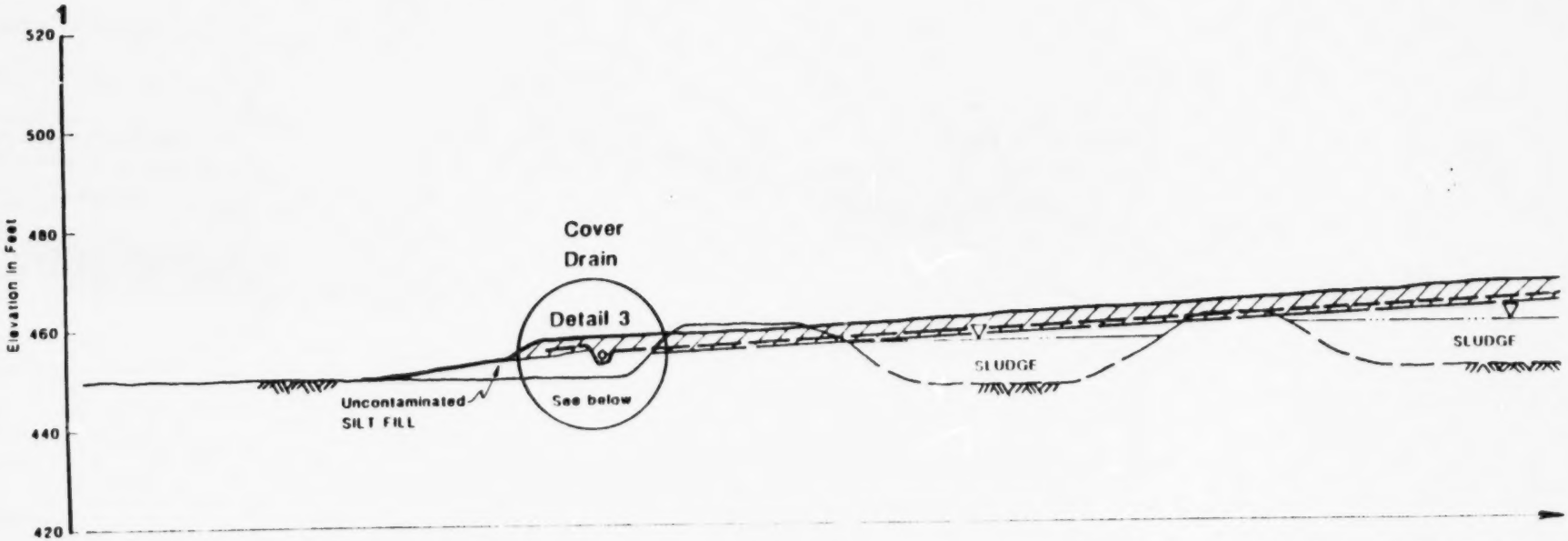
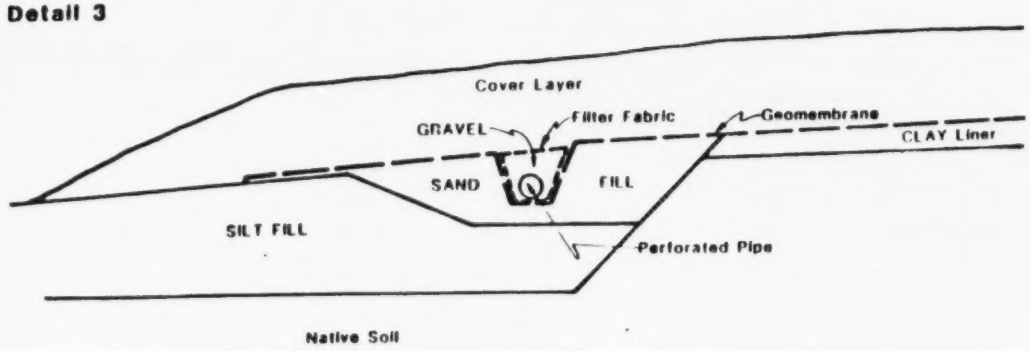


FIGURE 4

Generalized Subsurface Profile 1-1'



Detail 3



Typical Cover Configuration

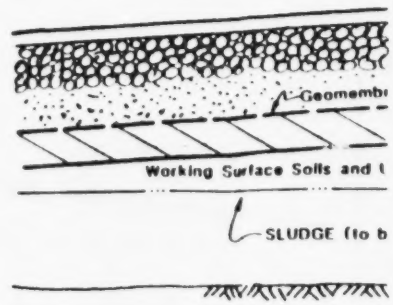


FIGURE 5
Left Side

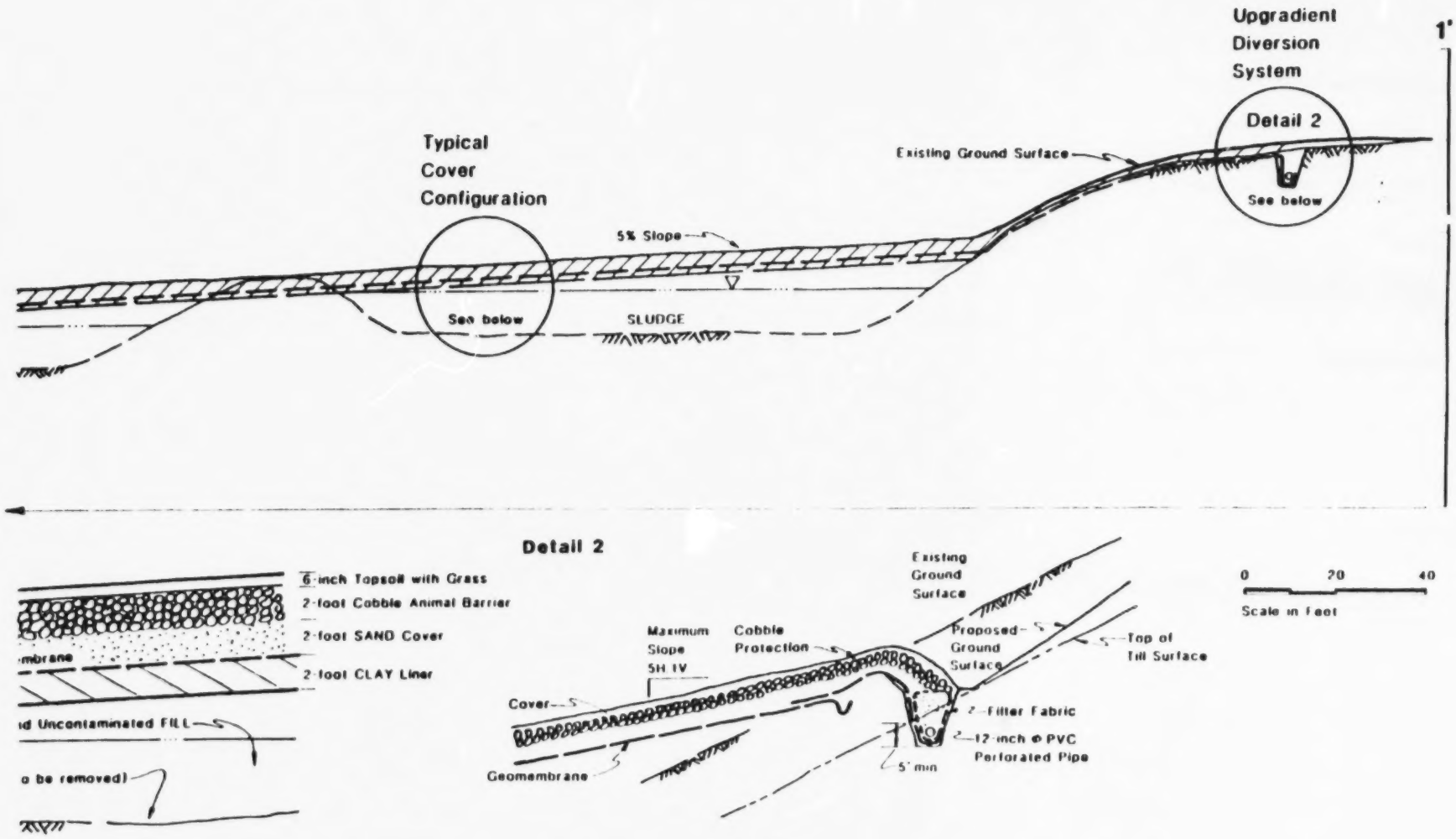


FIGURE 5
Right Side

The primary elements in the cover system will be a 2 foot thick layer of clay and a flexible geomembrane to prevent surface water from penetrating the subsoils (see Figure 5). A geomembrane consisting of 30 mils of reinforced PVC will be placed on this impermeable material. To protect the geomembrane, an additional 18 to 24 inches of sand will be placed on top. In order to protect the geomembrane from burrowing animals, a 24-inch layer of cobbles will be placed on top of the sand. The cobbles will range from 3-inch to 12-inch stone. During an appropriate season the cobbles will be covered with 6 inches of topsoil and vegetated with grasses.

To assess the performance of the source control remedial action, a monitoring system will be installed. The system will consist of seven wells located as shown on Figure 4. Six new wells will be installed. An existing well (HC-1) will be incorporated into the monitoring system. As shown, the wells are located to monitor water levels above the low permeability units both upgradient and downgradient of the ponds.

Performance monitoring will be completed after the site construction activities have ended. This monitoring program will consist of measuring water levels in the monitoring wells using a chalked steel tape, and assessing the condition of the upgradient diversion system, cover collection system, and the cover system. Measurements will be made on the following schedule:

- Monthly during the first year and quarterly during the second year after construction.
- Semi-annually the next two years (years 3 and 4 after construction).
- Annually thereafter in accordance with the provisions in the Consent Order.

OPERATION AND MAINTENANCE

In accordance with the CERCLA Section 106 Consent Order, the PRPs will establish a perpetual trust to assure the continued funding of monitoring and maintenance activities in the area of Ponds 1, 2, and 3, where the Initial Remedial Measures will be conducted. The trust shall be approved by EPA and funded by the PRPs upon completion of the activities in the work plan.

SCHEDULE

Seven key milestones have been established under the Consent Order for the completion of the Initial Remedial Measures:

On-site solidification and/or stabilization of sludge from Ponds 1, 2, and 3 (February 28, 1986); Transportation to disposal site (March 31, 1986); Placement of working surface soils into Ponds 1, 2, and 3 (April 30, 1986); construction of final upgradient diversion system (June 30, 1986); Construction of cover system without planting of vegetation (June 30, 1986); Installation of monitoring wells (June 30, 1986); Final implementation of work plan elements (July 31, 1986).

FUTURE ACTIONS

A work assignment has already been issued to one of EPA's remedial contractors to develop a work plan for the upcoming overall RI/FS. This work plan should be completed by the end of January 1986 and will serve as the basis for negotiating the RI/FS to be conducted by the PRPs. It is too early to project a schedule of activities for the RI/FS at this time.